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MODIFYING ENCLOSED TRAILERS TO TRANSPORT DISEASE-EXPOSED CATTLE

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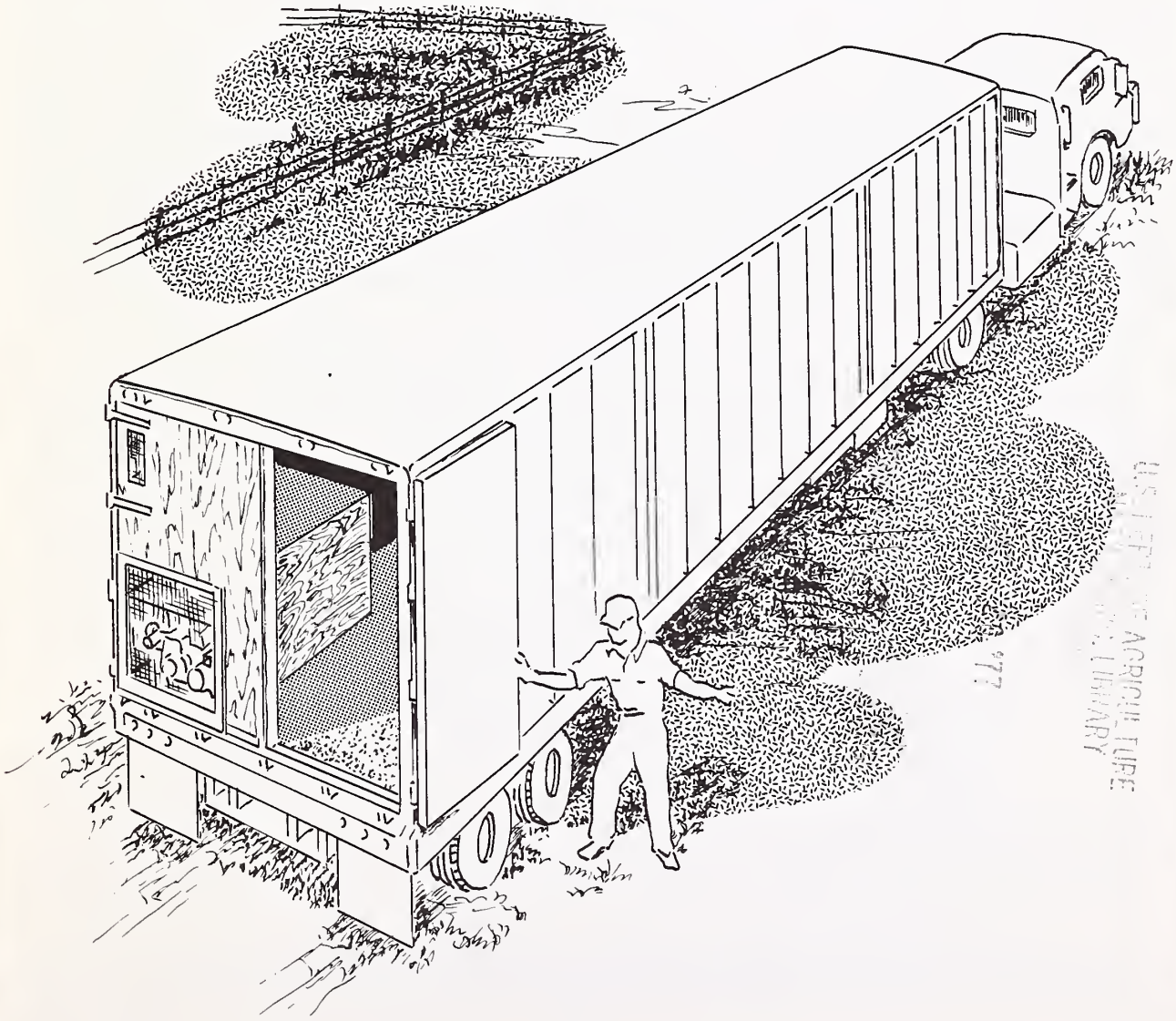
APRIL 1977



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MODIFYING ENCLOSED TRAILERS TO TRANSPORT DISEASE-EXPOSED CATTLE

By Paul E. James[1/]

SUMMARY

When a foreign disease appears in a region or area, all the infected and exposed animals are depopulated. Some of the disease-exposed animals not showing clinical symptoms could be utilized for their protein, if the animals could be safely removed to slaughter. This research describes the problems and presents construction and testing of a trailer modification for safely transporting disease-exposed animals where potential disease pathogens are contained in the trailer.

INTRODUCTION

Foreign animal diseases when introduced into the United States take a serious toll in meat production because of the currently accepted eradication-depopulating procedures of killing infected and exposed animals and disposing of the carcasses by burial, burning, or rendering. Since maintaining an adequate supply of food is becoming an increasingly serious problem, questions have been raised about the loss of meat resulting from such eradication methods. Many of the exposed animals sacrificed during depopulation are not showing clinical symptoms of disease; therefore, meat from these animals might be salvaged.

An Animal Protein Conservation Work Group was formed by USDA's Animal and Plant Health Inspection Service to determine if there is a safe method of salvaging this meat. It determined that one alternative to sacrificing all exposed animals is to isolate the diseased cattle and move the healthy cattle away from them. The cattle to be moved would be inspected and determined to be free of clinical illness before consignment to a slaughter plant for special processing. A possibility that disease pathogens might move with the animals makes necessary the movement of such animals in such a way as to contain any potential disease in the transporting vehicle. This report describes how to modify an enclosed trailer so disease-exposed cattle may be safely transported.

DESIGN DEMANDS

General Considerations

Since there is a high concentration of cattle on feedlots, there is a great possibility that disease may occur here. Most of these large feedlots are

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within 2 hours' hauling time from a slaughter plant; therefore, the modification is for short hauls. After each use the trailer interior should be thoroughly cleaned and disinfected. The filter should be examined and replaced if necessary. Because the cattle are in the trailers only a short time, providing an ideal environment for them is unnecessary. Nevertheless, there are three design demands that must be met by the modification: (1) The body of the trailers must be leak proof. No leakage of solid and liquid waste may be permitted. Many trailers have crevices around the doors and other openings. Means must be taken to prevent contaminated air from escaping through these openings. This was accomplished by exhausting the air from the trailer. An opening was also provided to allow air to enter the trailer. (2) The air leaving the trailer must be filtered to remove possible airborne disease pathogens. The millimicron size virus pathogens assume a static electric charge and attach themselves to larger particles in the range of 1 to 2.5 microns. Accordingly, a filter that would remove 95 percent of the larger particles was chosen. Prefilters are used to prevent large materials, such as dust, from clogging the openings in the third filter (see Air Filters). Adequate ventilation must be supplied for the animals' respiratory needs and removal of water vapor, ammonia, carbon dioxide, and excess heat produced by the cattle.

All of the modifications are shown in figure 1. This shows how the trailer is made leak proof, the location of the filters, and the ventilating system. Details of the modifications follow.

LEAK PROOFING

Leak proof the trailer body by laying heavy duty 6 mil polyethylene film on the floor and 5 feet up the walls (fig. 2). First fasten the plastic to the front of the trailer. Then proceed to the rear with the plastic. Use a double layer of plastic on the walls to provide a smooth surface and to avoid tearing when the animals rub. Overlap the plastic and apply mastic between the overlap. Place 1/2-inch thick asphalt-impregnated board over the plastic on the floor to give the animals a good footing and to prevent penetration of the plastic by the animals' hoofs. Install a 16-inch scuff board extending up the walls from the floor. Make this of 1/2-inch plywood. Place 1-inch of sawdust on the floor to absorb liquid waste materials.

AIR FILTERS

Install three air filters (fig. 3) as follows:

1. A fly screen made of nylon so that it can be burned after it has served its purpose.
2. A furnace-type filter next to the fly screen.
3. A high efficiency filter next to the furnace filter.

EXHAUST FAN

Use a blower with an inlet on only one side. Choose one designed for general duct ventilation application with a capacity of about 3,000 cubic feet of air with a suction pressure of 5/8-inch and a speed of 600 revolutions per minute.

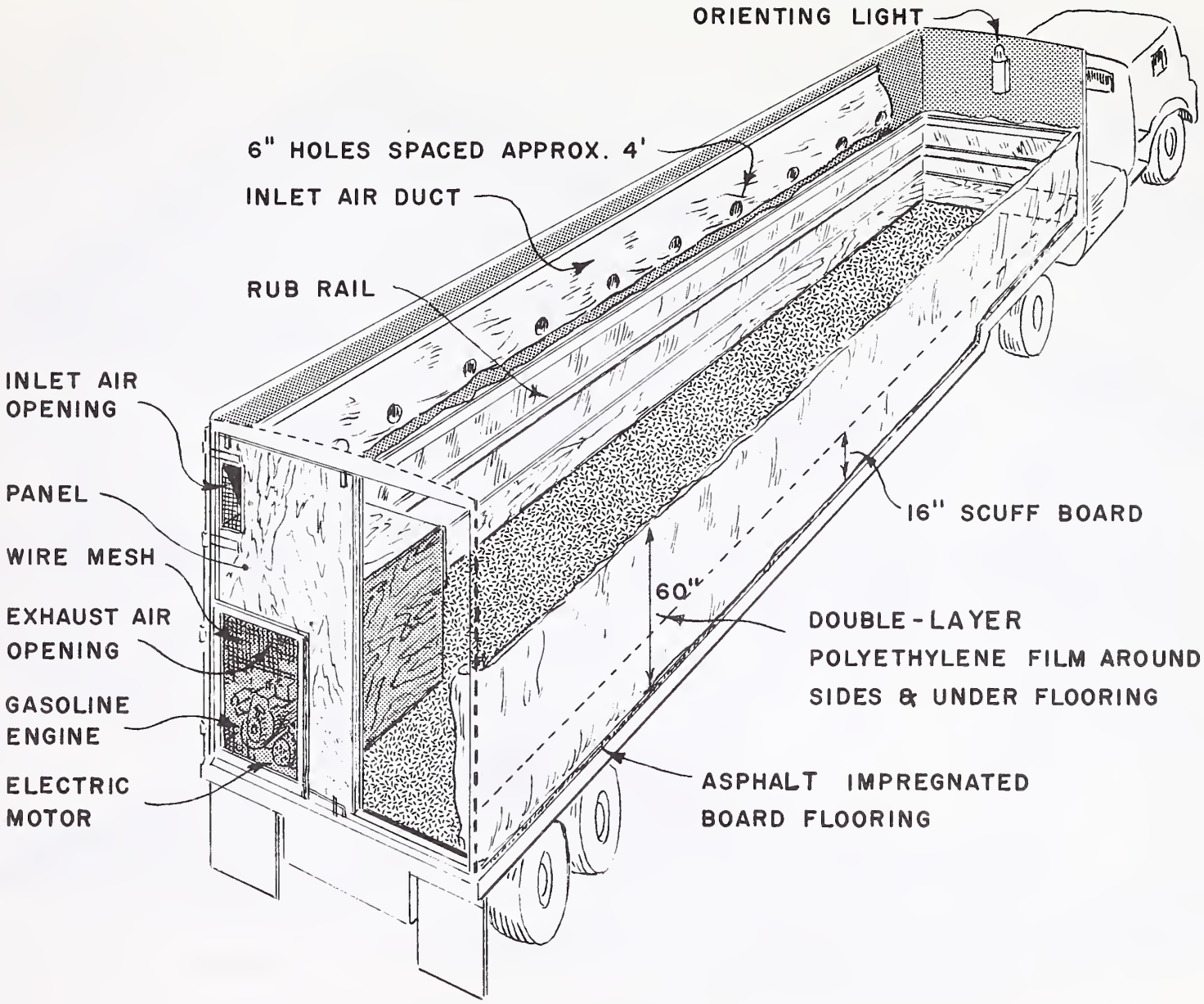

Figure 1. -- Modification of trailer.

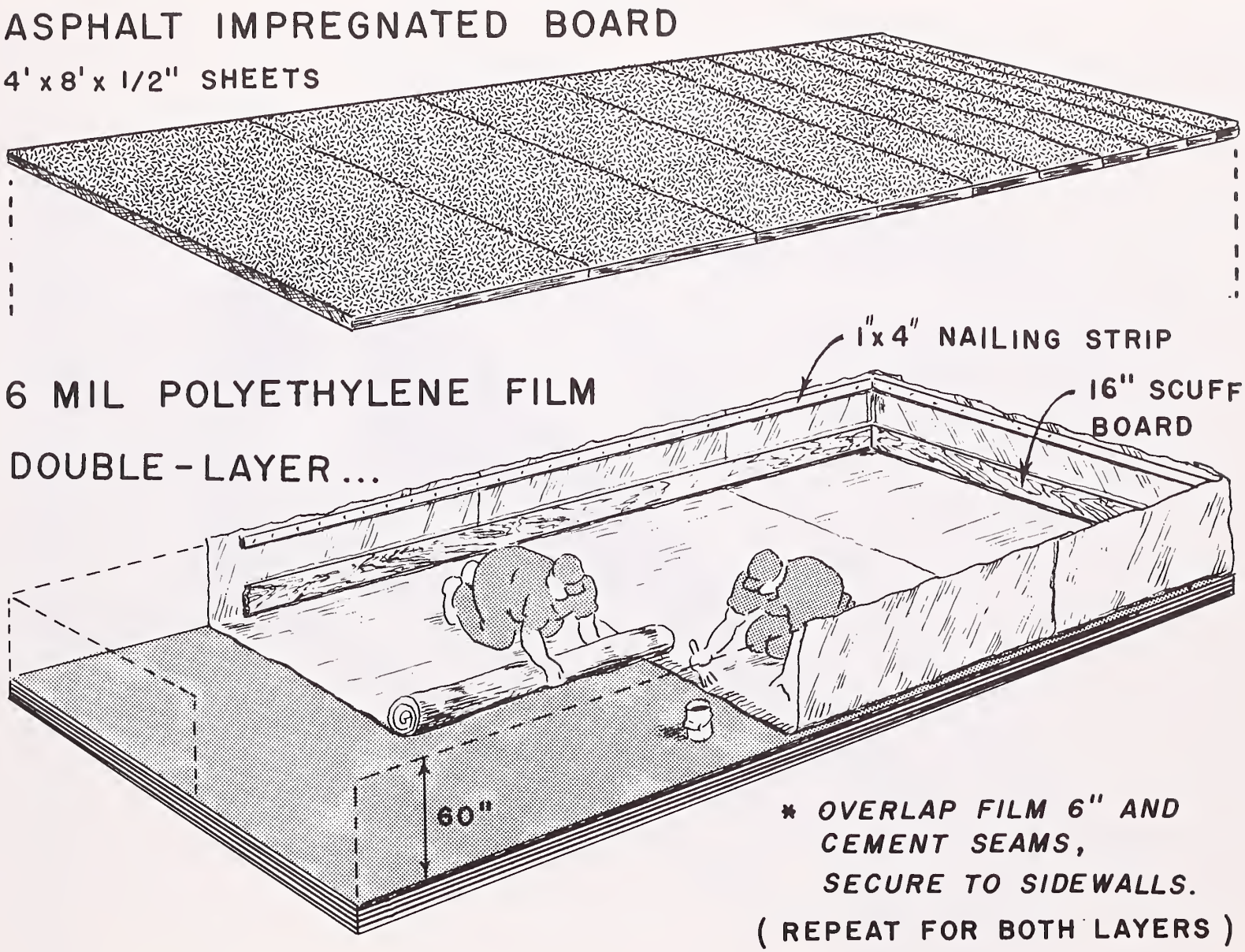
ASPHALT IMPREGNATED BOARD
4' x 8' x 1/2" SHEETS
1"x 4" NAILING STRIP
16" SCUFF BOARD
6 MIL POLYETHYLENE FILM
DOUBLE-LAYER...
60"
* OVERLAP FILM 6" AND CEMENT SEAMS, SECURE TO SIDEWALLS.
(REPEAT FOR BOTH LAYERS)

Figure 2. -- Installing sealing material in trailer.

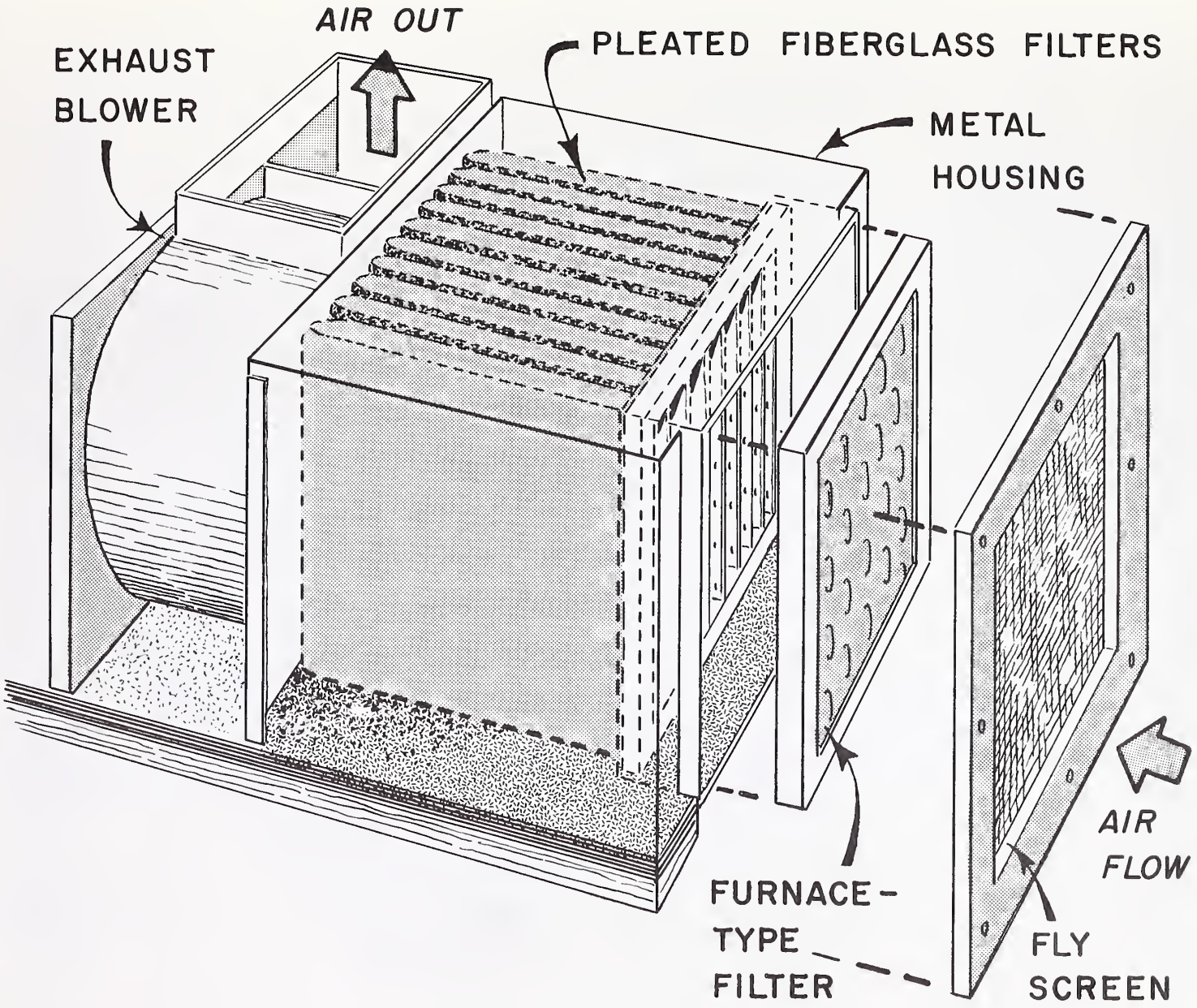

Figure 3. -- Exhaust filter location.

FAN DRIVE

Install a 4-horsepower horizontal drive shaft gasoline motor to drive the exhaust fan. Install a 2-hp electric motor beside the gasoline engine (fig. 4). The electric motor serves as a standby when the gasoline engine is being serviced or repaired.

Use double-groove sheaves and matching belts between the gasoline engine and the exhaust fan. The same belts can be removed and placed on the electric motor. Line the engine compartment in front of the engine exhaust with a flame-resistant material, such as sheet metal. Place a hardware cloth protective shield over the engine compartment. Mount a fire extinguisher in readily available location.

DUCT

Introduce fresh air through a duct located overhead on one wall. Make this duct from a strip of plastic similar to that used for sealing the body. This strip is 6 feet wide and 1 foot shorter than the length of the trailer. Also, staple a strip of plywood over the ends of the plastic. Attach one end of the duct to a collar at an opening in the rear of the trailer and seal the other end (fig. 5). Place a screen over the duct inlet. Cut 6-inch diameter holes at 4-foot intervals along the duct. The center of these holes should be 6 inches below the center of the duct. Cut a 6-inch diameter cardboard template to use as a pattern when cutting the holes.

CARPENTRY MODIFICATIONS

Modify the rear of the trailer by placing a frame and panel in the opening for the trailer door (fig. 6). Place rails on the floor of the trailer for the ventilating unit to slide on. Build a shroud for the ventilator (fig. 7). Construct a guard to protect the ventilating unit from the cattle (fig. 8).

Make the following checks before loading cattle in the trailer:

Belts are in good condition.
Gasoline tank is full.
Adequate oil is in crankcase.
Ventilating air filters are clean.
Start engine to see if it will run.

Occasionally check the engine to see that it is operating properly.

PERFORMANCE

This modification designed for a 40-foot trailer is adequate for transporting 19,000 pounds of cattle for a trip not to exceed 2 hours. If the trip is longer, the engine may run out of gas.

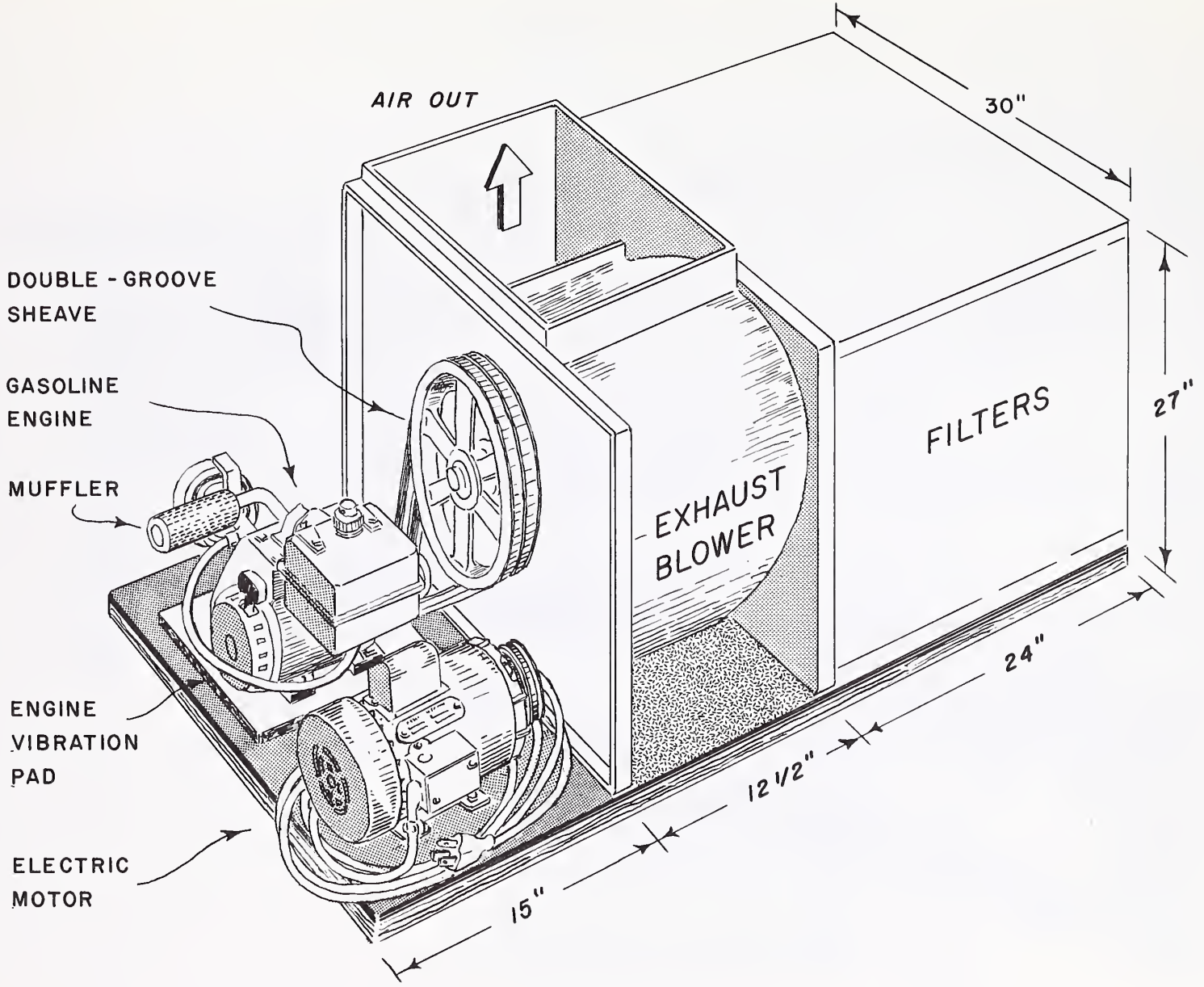

Figure 4. -- Location of fan drive mechanism.

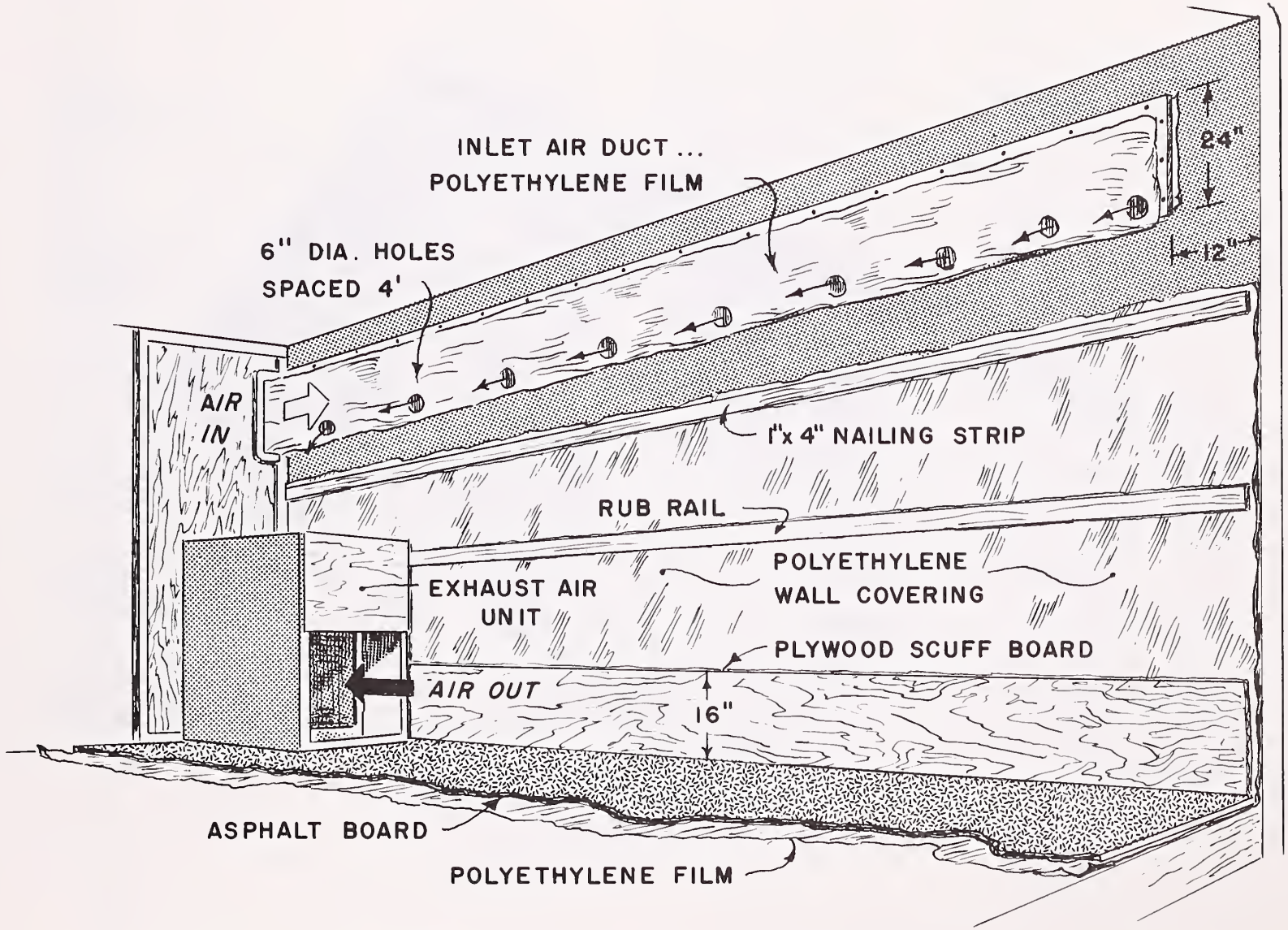

Figure 5. -- Location of air inlet duct.

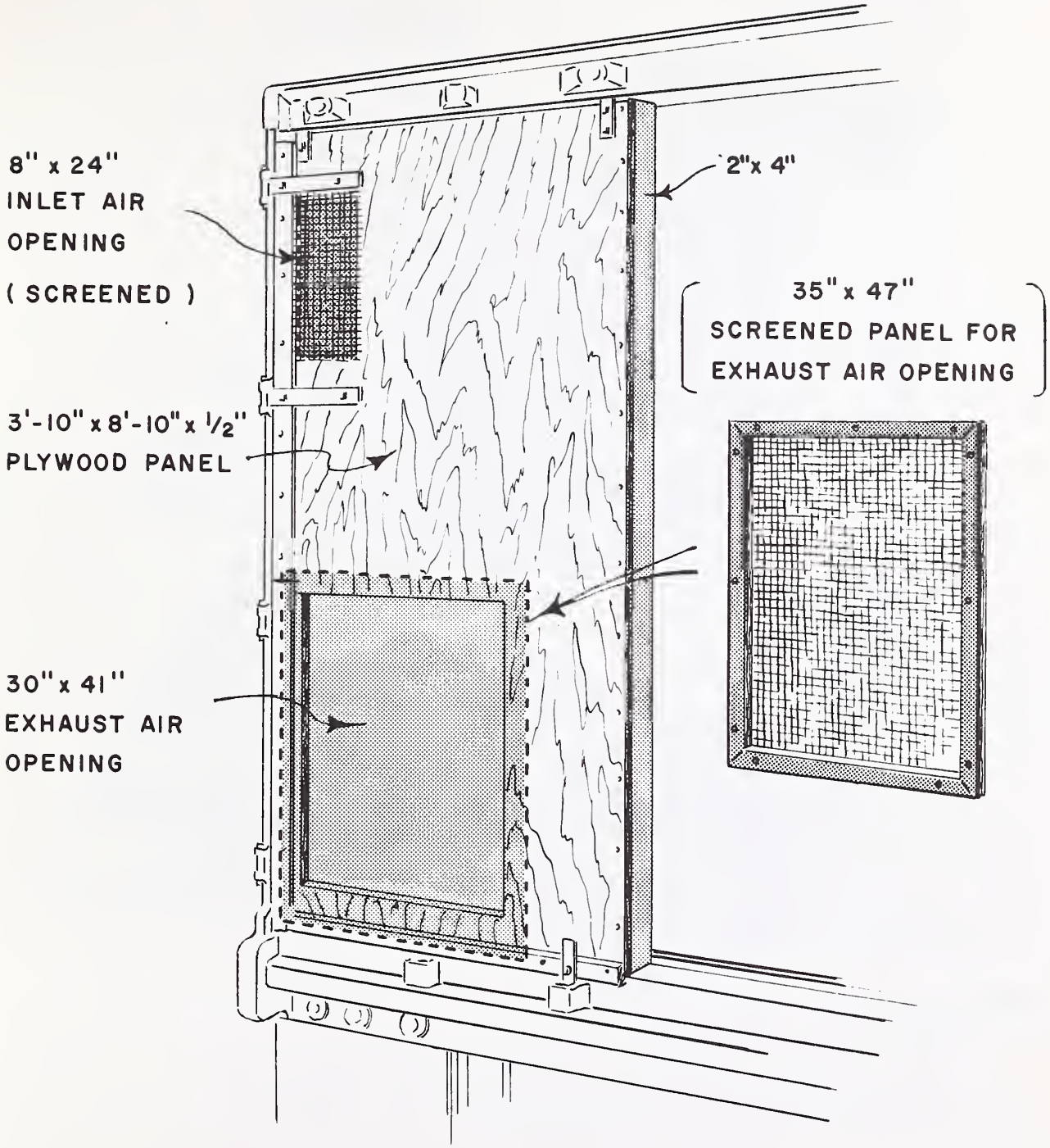

Figure 6. -- Panel with openings in rear of trailer.

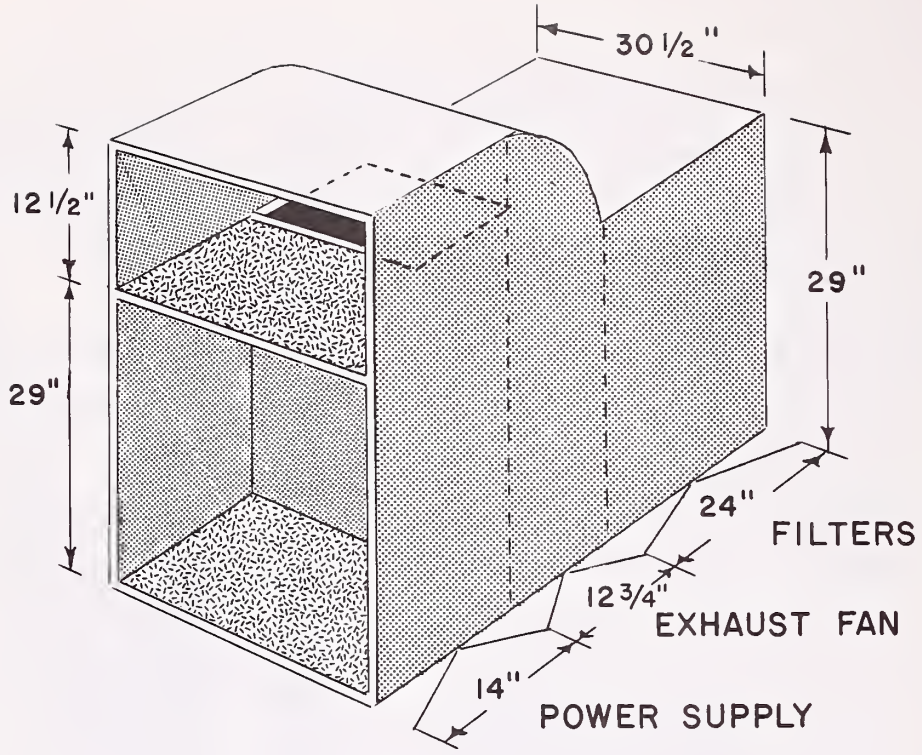

Figure 7. -- Shroud for ventilator.

BILL OF MATERIAL

The following list of materials is prepared for estimating purposes. If used for the purchase of materials, the quantities should be verified by the builder. Reasonable allowances have been made for waste where this is a factor. Since it is impracticable to provide a complete list of suppliers, a partial listing is given. No discrimination is intended, and no guarantee of reliability is implied.

Sealing Materials:

Polyethylene 16' x 100' 6 mil
Plastic cement 1 gallon
Asphalt impregnated board 4' x 8' x ½" 10 pieces
Hold down strips and rub rails 2" x 8' x ½" 24 pieces
Scuff boards 16" x 8' x ½" 12 pieces

Door Filler:

Frame:

2" x 4" x 10' 2 pieces
2" x 4" x 8' 3 pieces

Panels:

4' x 8' x ½" 1 piece plywood
4' x 2' x ½" plywood

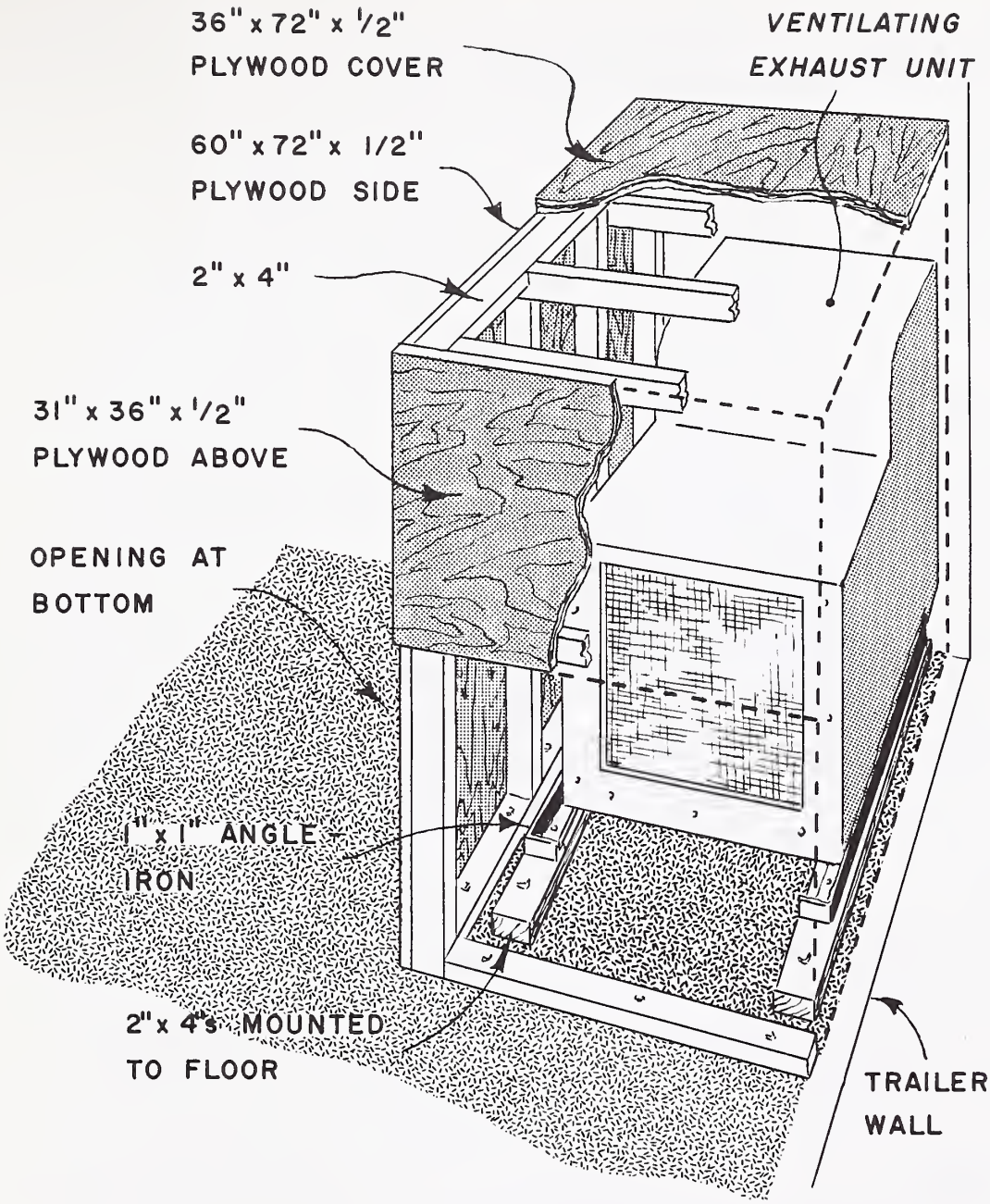

Figure 8. -- Cattle guard over ventilating unit.

Duct:

Polyethylene 6' x 50' roll 6 mil
Hold down strips 1" x 8' x ¼" 6 pieces

Air Moving Equipment:

Base 4' x 4' x 3/4" plywood
Slide rails 1" x 1" x 5' angle iron 2 required
Rail supports 2" x 4" x 10' 1 required
Blower, single inlet, 18-1/8" diameter wheel
W.W. Grainger, Inc. Stock No. 4C218
Double-groove cast iron sheave for blower
13.75 inch diameter, bushed bore
W.W. Grainger, Inc. Stock No. 2BK140H
Split tapered bushing with 1" bore
W.W. Grainger, Inc. Stock No. 3X576
Gasoline engine, 4 h.p. horizontal drive
Double-groove cast iron sheave, 2.95" diameter 3/4" bore
W.W. Grainger, Inc. Stock No. 3X516
Electric motor, 2 h.p. totally enclosed
capacitor motor 3450 r.p.m. 110 volts
W.W. Grainger, Inc. Stock No. 5K961
Double-groove cast iron sheave 2.95" diameter 5/8" bore
W.W. Grainger, Inc. Stock No. 3X388
Vibration pads 6" x 6" x ½" cork
Belts, No. 4L-540 2 required
Electric wire, 3 wire - 25 feet, size according to local code.
Not smaller than No. 12
Shroud, aluminum 36" x 90" x 0.032"

Filters:

Frame 2' x 2' x ½" plywood
Fly screen support 2' x 2' x ¼" plywood
Fly screen 2' x 2' nylon
Prefilter 24" x 24" x 2"
Cambridge Filter Corp. Model No. 5B/G2323 1 required
High efficiency filter and frame for filters
Cambridge Filter Corp. Model 43P95

Cattle Guard:

Frame:
Uprights 2" x 4" x 10' 2 pieces
Horizontals 2" x 4" x 8' 3 pieces
Panels:
Side and cover 4' x 8' x ½" plywood 2 pieces
End 4' x 8' x ½" plywood

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